# 2017 National Geospatial Data Asset (NGDA) Theme Summary Report Elevation Theme

## Overview:

This report aggregates information related to the National Geospatial Data Asset (NGDA) Theme in the title above. NGDA Themes serve as the management units for collections of related NGDA Datasets that benefit from coordinated development and management across the NGDA national geospatial portfolio. These NGDA Datasets are considered national capital assets and must meet the criteria outlined in OMB Circular A-16 *Supplemental Guidance*. The guidance directs the Federal Geographic Data Committee (FGDC) through cooperation with Federal agencies to implement and use a Portfolio management approach for managing NGDA Themes and their associated NGDA Datasets both within and across NGDA Themes. This ensures NGDA Themes are managed by officially designated agencies, on behalf of all users. In addition, each NGDA Theme has a Strategic Plan that establishes goals and objectives and an associated Implementation Plan that describes the activities the Theme will undertake to address them. Unless otherwise noted, this report covers the period from the baseline Lifecycle Maturity Assessment (LMA) in 2015 to August 2017.

## NGDA Theme Details:

**Theme:** Elevation Theme

**Theme Definition:** The measured vertical position of the earth surface and other landscape or bathymetric features relative to a reference datum typically related to sea level. These points normally describe bare earth positions but may also describe the top surface of buildings and other objects, vegetation structure, or submerged objects. Elevation data can be stored as a three-dimensional array or as a continuous surface such as a raster, triangulated irregular network, or contours. Elevation data may also be represented in other derivative forms such as slope, aspect, ridge and drainage lines, and shaded relief.

**Theme Lead Agencies:** U.S. Department of Interior, U.S. Geological Survey and U.S. Department of Commerce, National Oceanic and Atmospheric Administration

**Theme Executive Champions:**

| | | |
|---|---|---|
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**Theme Leads:**

| | | |
|---|---|---|
| **Name:** | Diane Eldridge | Ashley Chappell |
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## Total Associated NGDA Datasets: 12

The following NGDA Datasets are associated with this NGDA Theme. This list includes an embedded hyperlink to the NGDA metadata found on Data.gov. Please note if the metadata has been updated and re-harvested after publication of this report, the link may no longer be valid. The NGDA Dataset may be searched for manually in Data.gov or GeoPlatform.gov by using the official NGDA Name (in Table 1 below) and including the keyword "NGDA" to narrow the results.

| NGDA Name and Associated Data.gov Link | Agency Acronym |
|---|---|
| U.S. Coastal Lidar Elevation Data - Including the Great Lakes and Territories, 1996 - present | DOC-NOAA |
| Coastal Digital Elevation Models (DEMs) | DOC-NOAA |
| Global Multi-Resolution Terrain Elevation Data - National Geospatial Data Asset (NGDA) | DOI-USGS |
| Lidar Point Cloud - USGS National Map | DOI-USGS |
| MultiBeam Bathymetry Database (MBBDB) | DOC-NOAA |
| 1/3rd Arc-second Digital Elevation Models (DEMs) - USGS National Map | DOI-USGS |
| National Flood Hazard Layer (NFHL) | DHS-FEMA |
| NGDC Marine Trackline Geophysics Database | DOC-NOAA |
| NOS Hydrographic Surveys Collection | DOC-NOAA |
| Shuttle Radar Topography Mission (SRTM) | DOI-USGS |
| 1 meter Digital Elevation Models (DEMs) - USGS National Map | DOI-USGS |
| 5 Meter Alaska Digital Elevation Models (DEMs) - USGS National Map | DOI-USGS |

**Table 1: Theme NGDA Datasets.**

# Lifecycle Maturity Assessment (LMA) Overview

## Introduction

The Geospatial Data Lifecycle has seven stages that agencies should use when developing, managing and reporting on NGDA Datasets.  These stages and their associated benchmarks[1] are defined in the A-16 *Supplemental Guidance* Stages of the Geospatial Data Lifecycle (see Figure 1).  Reporting on the status of each NGDA Dataset is an OMB requirement, and assessing the developmental maturity of the NGDA provides managers the ability to support NGDA Datasets in a more universal and transparent manner. The FGDC NGDA lifecycle maturity assessment is based on responses made by Dataset Managers to questions associated with benchmarks in each lifecycle stage. Each stage has a range of benchmark activities, from no activity to significant activity, which provide the interpretation of maturity for each benchmark within a stage and cumulatively for each stage. The cumulative level of activity across each stage and for all stages determines the maturity of the each NGDA Dataset based on a Maturity Matrix (see Table 2) and the response metrics from How to Calculate Maturity. In this report, the LMA results for all the associated NGDA Datasets are aggregated through an average calculation at the Theme level.  Additional information can be found at the GeoPlatform.gov 2017 Lifecycle Maturity Assessment (LMA) Community web page. Individual NGDA Dataset Reports can be found at FGDC.gov.
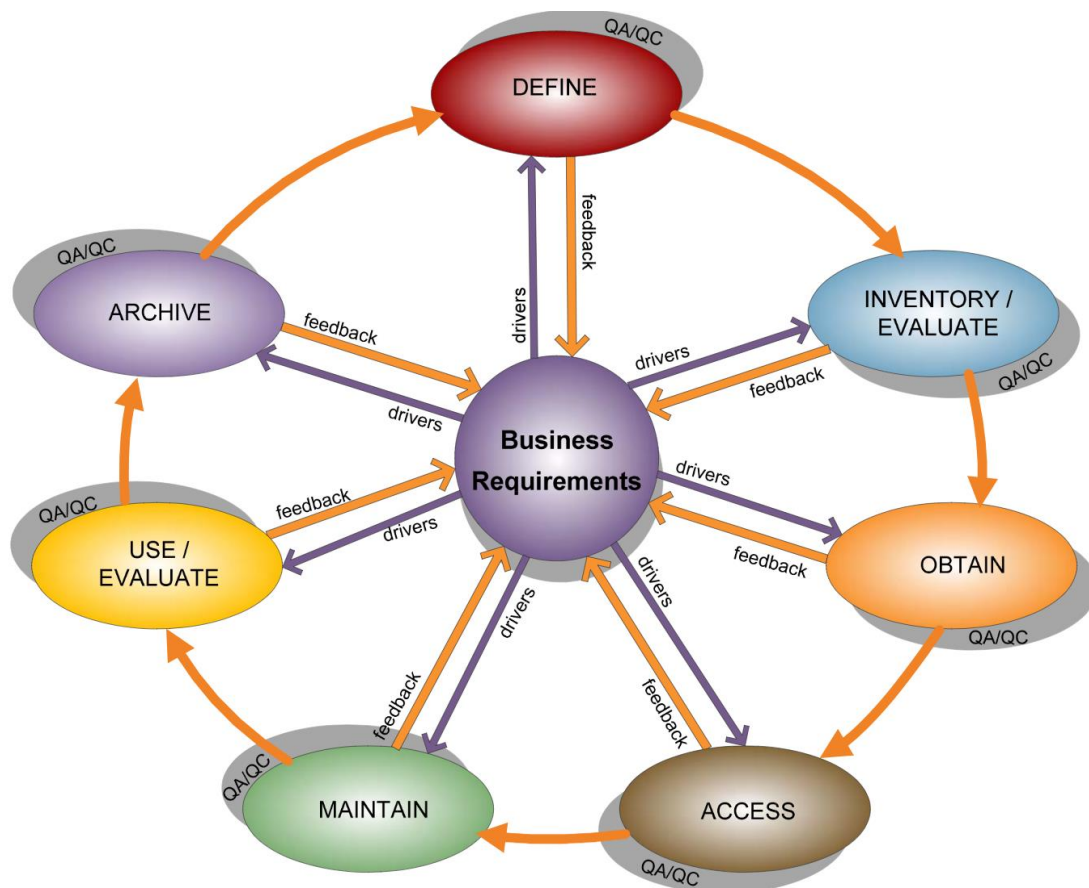


**Figure 1. The Geospatial Data Lifecycle**

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[1] Benchmarks are detailed in Table B1 of the Stages of the Geospatial Data Lifecycle document.

## 2017 Lifecycle Maturity Assessment Maturity Matrix

The Lifecycle Maturity Assessment Maturity Matrix provides descriptions of the maturity characteristics of benchmark activities for each stage within a dataset that result in a maturity level of 0-5, with no activity being level zero and optimized being level five, applied consistently across all lifecycle stages.

| Maturity Level | Maturity Characteristics for All Lifecycle Stages |
|---|---|
| **Optimized; Established Level = 5** | Dataset meets virtually all business needs of all users. The dataset is considered authoritative by owners and secondary users. It is curated across all stages of the approved lifecycle. Future needs are defined for both the primary owner and secondary users on a regular basis and resources for addressing both current and future business requirements are available. |
| **Mature; Consistent Level = 4** | Dataset meets all the business needs of the primary owner and most of the secondary users. The dataset is curated and used as an authoritative resource by the primary owner and secondary users. Future needs are being identified and steps are planned to address these. All stages are supported and reviewed on a recurring basis. The dataset is well managed in relation to the approved lifecycle. |
| **Managed; Predictable Level = 3** | Dataset meets a significant number of the business needs of the primary owner and is widely used by secondary users. Benchmark activities are occurring in at least four of the approved lifecycle stages. Management practices in relation to the approved lifecycle is moderate but consistent. Dataset is integrating changing business requirements in lifecycle stages impacting overall maturity. |
| **Transition; Transformation Level = 2** | Dataset meets business needs of the primary owner and has moderate use by secondary users. Benchmark activities are occurring in at least three stages. Efforts to integrate funding, include partners, and obtain data are not supported in a sustained manner. Management practices in relation to the stages of the approved lifecycle is limited. |
| **Planned; Initial Development Level = 1** | Dataset in initial planning or limited in meeting business needs of the primary owner. Benchmark activities in the approved lifecycle are just starting to consider secondary uses, Partners/stakeholders involvement is being defined and developed to support additional dataset uses. Dataset development is in a very early stage. Minimal or limited management against the benchmarks in the approved lifecycle. |
| **No Activity Level = 0** | Dataset not developed or meets project/local business needs of the primary owner. Secondary, additional uses, or partners/stakeholders were not considered. Dataset is not recognized as authoritative data or is part of a similar dataset. Not managed to any of the benchmarks in the approved lifecycle. |

**Table 2: 2017 Maturity Matrix.**

## 2017 LMA Maturity Results for the Theme

Based on the LMA results, maturity averages are calculated for all NGDA Datasets associated with the Theme to illustrate a roll-up of the general questions for all stages, and each lifecycle stage as shown in Table 3 below. This table provides a high-level view of the aggregated maturity of the NGDA Datasets in the Theme.

| Maturity Categories | Maturity Level |
|---|---|
| **Roll-up NGDA Maturity** | **5 - Optimized; Established** |
| | |
| **General Questions for All Stages** | 4 - Mature; Consistent |
| **Stage 1: Plan/Define** | 5 - Optimized; Established |
| **Stage 2: Inventory/Evaluate** | 5 - Optimized; Established |
| **Stage 3: Obtain** | 4 - Mature; Consistent |
| **Stage 4: Access** | 5 - Optimized; Established |
| **Stage 5: Maintain** | 5 - Optimized; Established |
| **Stage 6: Use/Evaluate** | 4 - Mature; Consistent |
| **Stage 7: Archive** | 4 - Mature; Consistent |

**Table 3: 2017 Maturity Results.**


## LMA Process Changes between 2015 and 2017

In 2015, a baseline assessment of NGDA was performed for each of the datasets in the federal geospatial portfolio. Information related to the 2015 baseline LMA can be found at 2015 NGDA Lifecycle Maturity Assessment, which also includes a link to the 2015 Reports. A follow-up analysis of the 2015 LMA baseline process and its results identified ways to improve the LMA workflow, increase efficiency as well as decrease the reporting burden. Several recommendations were identified and implemented in 2017, which included improvements to normalize the responses in 2017. A secondary effect of improvements to normalization is that results from 2017 and 2015 are not directly comparable. These changes, and their impacts, are detailed in the webpage: Temporal Changes in Lifecycle Maturity Assessment (LMA) Maturity and Results Comparisons.

## Aggregated Maturity Level for Theme NGDA Datasets

The pie graph below shows the number of NGDA Datasets within each maturity level for this Theme.
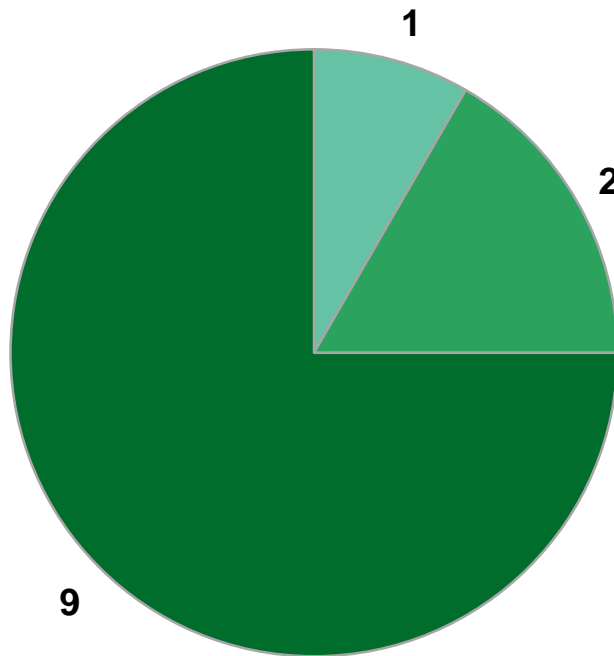


**Graph 1: Aggregated NGDA Dataset Maturity Level Counts in the Theme.**

**Key for NGDA Dataset Maturity Level:**

| Optimized; Established Level = 5 5/5 | Mature; Consistent Level = 4 4/5 | Managed; Predictable Level = 3 3/5 | Transition; Transformation Level = 2 2/5 | Planned; Initial Development Level = 1 1/5 | No Activity Level = 0 0/5 |
|---|---|---|---|---|---|

## Stage-based Maturity Levels for Theme NGDA Datasets

The following graphs provide information about the NGDA Dataset maturity level counts for each lifecycle stage within the Theme. This information visualizes the NGDA Datasets according to the maturity matrix, which can show potential opportunities or challenges within a Theme.
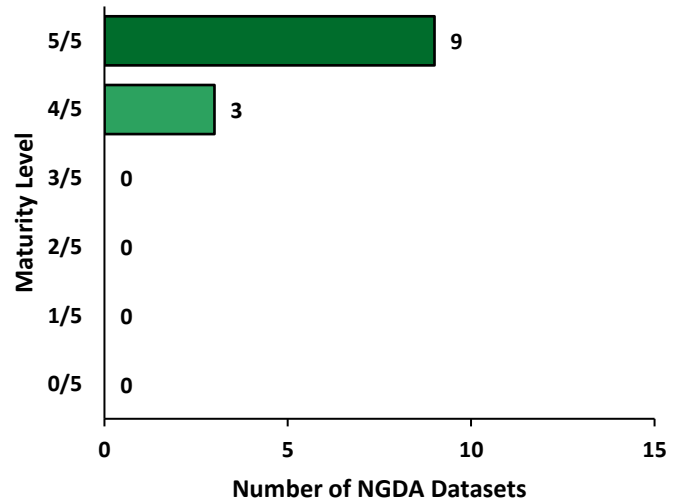
## General Questions

Data characteristics that are applicable to all stages.
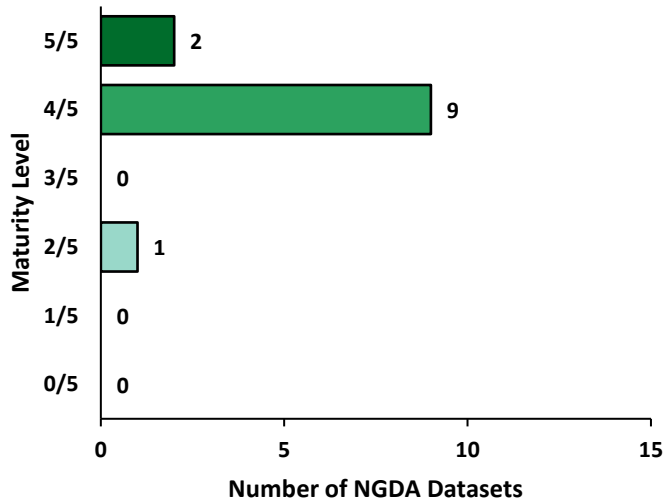


**Graph 2: General Questions Stage NGDA Maturity Level Counts.**
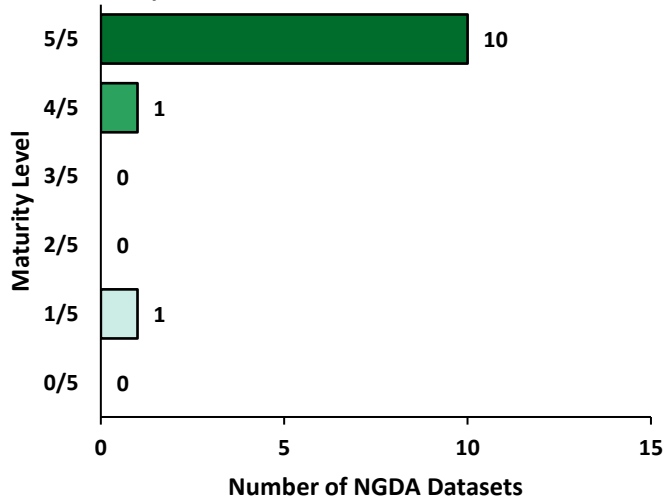
## Stage 1 - Define/Plan

Characterization of data requirements based upon business-driven user needs.



**Graph 3: Define/Plan Stage NGDA Maturity Level Counts.**

## Stage 2 - Inventory/Evaluate

The creation and publication of a detailed list of data assets and data gaps (both internal and external) as they relate to business-driven user needs.



**Graph 4: Inventory/Evaluate Stage NGDA Maturity Level Counts.**

## Stage 3 - Obtain

The collection, purchase, conversion, transformation, sharing, exchanging, or creation of geospatial data that were selected to meet the business needs is identified.
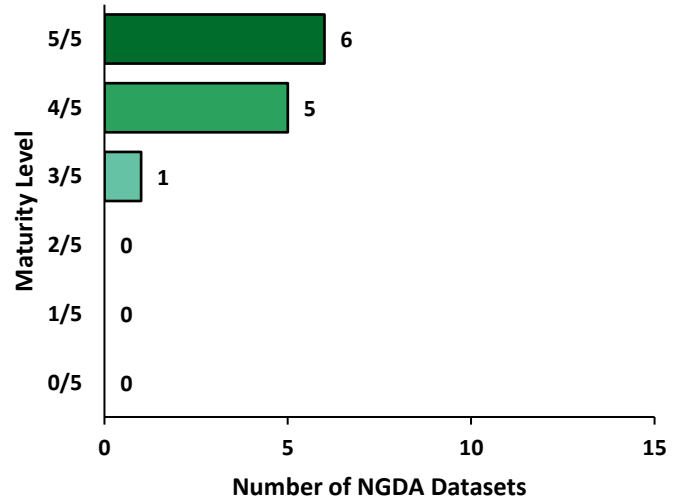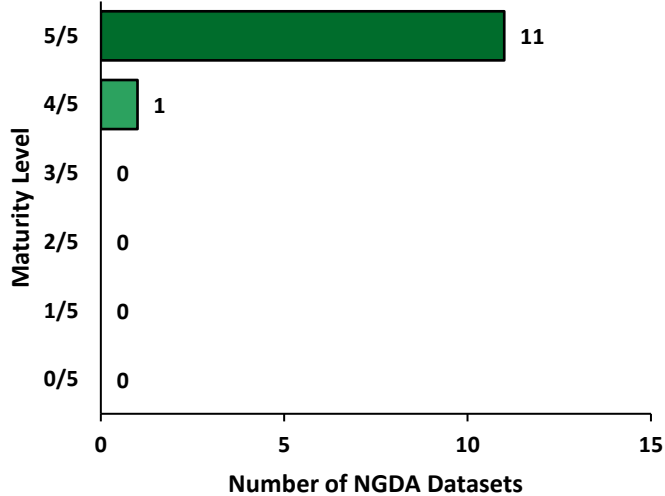


**Graph 5: Obtain Stage NGDA Maturity Level Counts.**

**Key for NGDA Dataset Maturity Level:**

| Optimized; Established Level = 5 5/5 | Mature; Consistent Level = 4 4/5 | Managed; Predictable Level = 3 3/5 | Transition; Transformation Level = 2 2/5 | Planned; Initial Development Level = 1 1/5 | No Activity Level = 0 0/5 |
|---|---|---|---|---|---|

## Stage 4 - Access

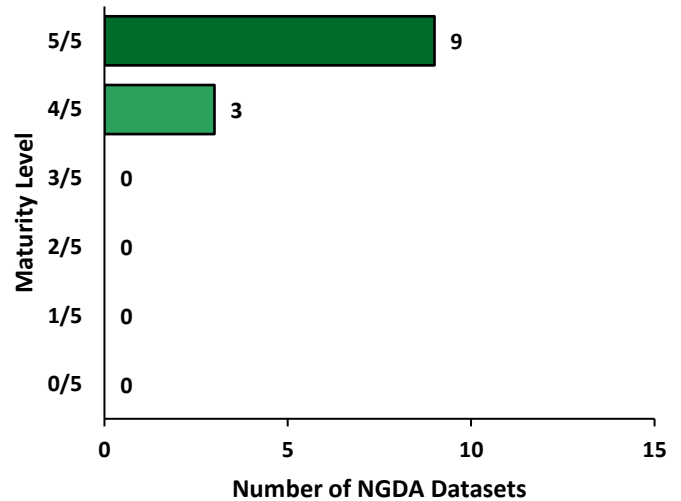**Making data known and retrievable through documentation and discovery mechanisms to meet user needs and business requirements.**

Maturity Level (vertical axis):
- 5/5 — 11
- 4/5 — 1
- 3/5 — 0
- 2/5 — 0
- 1/5 — 0
- 0/5 — 0

Number of NGDA Datasets (horizontal axis: 0, 5, 10, 15)

**Graph 6: Access Stage NGDA Maturity Level Counts.**

## Stage 5 - Maintain

**The ongoing processes and procedures to ensure that the data meet business requirements.**

Maturity Level (vertical axis):
- 5/5 — 9
- 4/5 — 3
- 3/5 — 0
- 2/5 — 0
- 1/5 — 0
- 0/5 — 0

Number of NGDA Datasets (horizontal axis: 0, 5, 10, 15)

**Graph 7: Maintain Stage NGDA Maturity Level Counts.**

## Stage 6 - Use/Evaluate

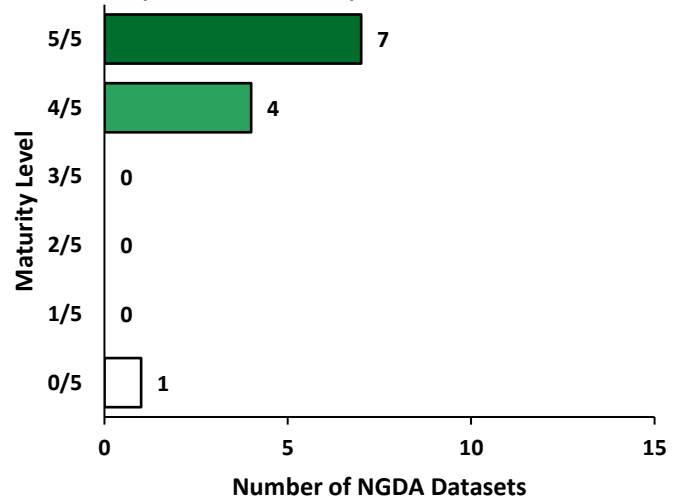**The ongoing assessment, validation, and potential enhancement of data to meet user needs and business requirements.**

Maturity Level (vertical axis):
- 5/5 — 8
- 4/5 — 2
- 3/5 — 1
- 2/5 — 1
- 1/5 — 0
- 0/5 — 0

Number of NGDA Datasets (horizontal axis: 0, 5, 10, 15)
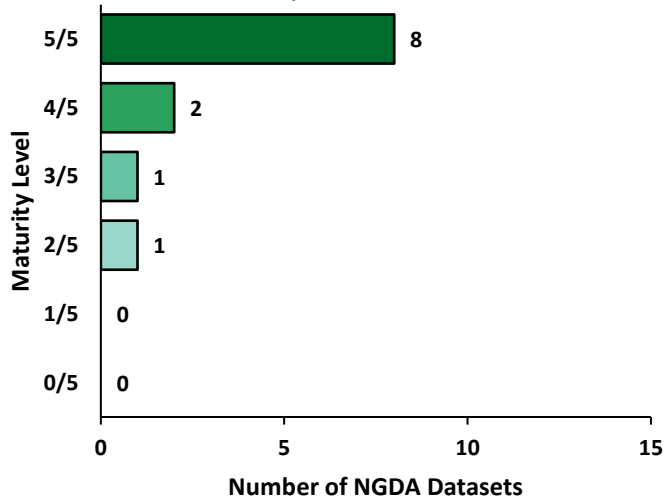
**Graph 8: Use/Evaluate Stage NGDA Maturity Level Counts.**

## Stage 7 - Archive

**Facilitate the appraisal, retention, storage, and accessibility of data and establish mechanisms for development of stewardship tools and services.**

Maturity Level (vertical axis):
- 5/5 — 7
- 4/5 — 4
- 3/5 — 0
- 2/5 — 0
- 1/5 — 0
- 0/5 — 1

Number of NGDA Datasets (horizontal axis: 0, 5, 10, 15)

**Graph 9: Archive Stage NGDA Maturity Level Counts.**

**Key for NGDA Dataset Maturity Level:**

| Optimized; Established Level = 5 5/5 | Mature; Consistent Level = 4 4/5 | Managed; Predictable Level = 3 3/5 | Transition; Transformation Level = 2 2/5 | Planned; Initial Development Level = 1 1/5 | No Activity Level = 0 0/5 |
|---|---|---|---|---|---|

## Theme NGDA Dataset Maturity Levels for Selected LMA Questions

In this section, several LMA questions have been identified that provide additional insight into Theme NGDA Dataset maturity levels including funding, obtaining data (acquisition), and quality control/quality assurance. By separating these questions from a particular stage, more information can be discerned about the NGDA Datasets within a Theme and help identify activities that are doing well or where some additional attention may be needed. For each of these maturity questions, if the "0/5" (No process exists) option was selected, additional detail was requested. Optional information could also be provided for the supplemental justification questions under the "Other" response option.

## Funding

Question 1 in the LMA asks about a process to obtain funding for all lifecycle stages such as planning, development, maintenance, access, and archiving of an NGDA Dataset. The question also provides additional detail about primary and secondary funding sources.

| Question 1 | | General Questions |
|---|---|---|
| **Is there a recurring process to obtain funding for all lifecycle stages of this dataset?** | | |
| **Maturity Level** | **Number of Responses** | **Response Options** |
| 5/5 | 3 | Funding support is part of agency budget on a recurring basis, funding is consistent and tied to business requirements, and supports all lifecycle stages |
| 4/5 | 0 | Funding is currently adequate and consistent but tied to business requirements whose appropriations are not directed to support all lifecycle stages of the NGDA |
| 3/5 | 7 | Funding support exists but is not adequate to meet known requirements, most lifecycle stages are supported |
| 2/5 | 0 | Funding is planned at agency level, supporting staff is assigned, but funding is not recurring, some lifecycle stages are supported |
| 1/5 | 1 | Funding is from local offices, budgeting effort is minimal, staffing is minimal |
| 0/5 | 1 | No process to obtain funding exists (Please explain)<br>• The Global Multi-Resolution Terrain Elevation Data (GMTED2010) was a reimbursable activity funded from the National Geospatial-Intelligence Agency (NGA) between 2007 and 2010. The funding was for data development but did not include ongoing maintenance or operations funding. |

Table 4: NGDA Maturity Level Totals for Funding.

| Question 1.a | General Questions |
|---|---|
| **1.a) To justify your response to Question 1, what is the primary funding source for your NGDA?** | |

| Number of Responses | Response Options |
|---|---|
| 5 | **Federal agency –** General lead agency budgetary funding for a specific program that supports this NGDA or the NGDA itself. |
| 5 | **Federal interagency –** Agreements between two or more different Federal Department(s), Agency(ies), Bureau(s), and/or Office(s) to provide funding for a specific program that supports this NGDA or the NGDA itself. |
| 1 | **Other –** (Please explain)<br>• This dataset is supported on base funds. The data center (archive) has funds for receiving, inventorying, redistributing, and archiving the data at a minimal level. There is not typically funding for improving these aspects of the data lifecycle. Additional funding could improve data coverage, data acquisition, and quality review.) |

**Table 5: Primary Funding Source for NGDA Datasets in Theme.**

| Question 1.b | General Questions |
|---|---|
| **1.b) To justify your response to Question 1, what is the secondary funding source for your NGDA?** | |

| Number of Responses | Response Options |
|---|---|
| 4 | **Federal interagency –** Agreements between one or more other Federal Department(s), Agency(ies), Bureau(s), and/or Office(s) to provide funding for a specific program that supports this NGDA or the NGDA itself. |
| 4 | **Tribal government –** Agreements with Tribal government(s) to provide funding for a specific program that supports this NGDA or the NGDA itself. |
| 4 | **State government –** Agreements with State government(s) to provide funding for a specific program that supports this NGDA or the NGDA itself. |
| 4 | **Local government –** Agreements with local government(s) to provide funding for a specific program that supports this NGDA or the NGDA itself. |
| 4 | **Consortium –** Agreements with multiple governmental and/or non-governmental entities that have formed a consortium to provide funding for a specific program that supports this NGDA or the NGDA itself. |

**Table 6: Secondary Funding Source for NGDA Datasets in Theme.**

## Obtaining Data

Question 10 in the LMA identifies whether a process exists for obtaining data related to the NGDA and if so, what actions are performed to obtain data. There may be multiple ways data is obtained for an NGDA Dataset.

| Question 10 | | Stage 3 - Obtain |
|---|---|---|
| **Is there a process for obtaining data for this dataset?** | | |
| **Maturity Level** | **Number of Responses** | **Response Options** |
| 5/5 | 11 | Fully implemented including recurring assessments |
| 4/5 | 1 | Implementation well established |
| 3/5 | 0 | Implementation progressing |
| 2/5 | 0 | Developed, documented, and implementation started |
| 1/5 | 0 | Under development |
| 0/5 | 0 | No process exists |

**Table 7: NGDA Maturity Level Totals for Obtaining Data.**

| Question 10.a | Stage 3 - Obtain |
|---|---|
| **10.a) To justify your response to Question 10, what actions are performed to obtain data?** | |
| **Number of Responses** | **Response Options** |
| 6 | Obtain data by purchasing |
| 5 | Obtain data by modifying, converting, or transforming data |
| 6 | Obtain data by sharing/exchanging |
| 3 | Obtain data by creating and/or collecting the data |

**Table 8: Actions Performed to Obtain Data for NGDA Datasets in Theme.**

## Quality Assurance/Quality Control (QA/QC)

Question 15 in the LMA asks whether a process for quality assurance/quality control exists and the level of maturity of the process.

| Question 15 | | Stage 5 - Maintain |
|---|---|---|
| **Is there a quality assurance/quality control (QA/QC) process as part of this dataset's maintenance?** | | |
| **Maturity Level** | **Number of Responses** | **Response Options** |
| 5/5 | 6 | Fully implemented including recurring assessments |
| 4/5 | 5 | Implementation well established |
| 3/5 | 1 | Implementation progressing |
| 2/5 | 0 | Developed, documented, and implementation started |
| 1/5 | 0 | Under development |
| 0/5 | 0 | No process exists |

**Table 9: NGDA Maturity Level Totals for Quality Assurance/Quality Control Process.**

# Elevation Theme Strategic Goals and Objectives Progress Report

## Introduction and Background

Each NGDA Theme has a Theme Strategic Plan to guide Theme development and management. It is developed by the Federal agencies with Theme leadership roles. Each Theme Strategic Plan describes the goals and objectives for the Theme and generally spans 3 to 5 years.  It is assessed annually as needed for significant changes. In 2016-2017, the FGDC Steering Committee identified the additional priority for each Theme to develop a Theme Implementation Plan that identifies the actions and activities necessary to achieve the Theme's goals and objectives. The NGDA Themes' Strategic and associated Implementation Plans are available in Adobe PDF format via the respective Geoplatform.gov NGDA Theme Community pages (see Resource Links below).

## Resource Links

**Theme Strategic Plan:** [Elevation Theme Strategic Plan](Elevation Theme Strategic Plan)

**Theme Implementation Plan:** Elevation Theme Implementation Plan

## Progress in 2017

As noted above, Theme Strategic Plans identify goals and objectives for the Theme as they relate to Agency Strategic Plans. The Theme Implementation Plans further identify actions and activities that will be taken to support those goals and objectives. The Implementation Plans also include milestones, projected completion dates and performance indicators, and identify stakeholders and responsible parties. A summary of progress against the Theme Strategic Plan goals and objectives is provided as part of this overall Theme Summary Report. The following table shows the progress status made toward achieving the objectives during 2017.  Status includes three categories: 'Not Started' for those activities that have not gotten underway; 'In Progress' for those activities underway which will continue into the next year; 'Complete' for the activities finished in this time frame. Additionally, if activities supporting the goal and objective are completed in the current year and will reoccur again on an annual basis, they are designated 'Recurring (completed for 2017)'.

| Goals and Objectives undertaken during 2017 | Status |
|---|---|
| **Goal 1: Ensure that federal elevation data programs meet user needs and are robustly managed.** | |
| Objective 1.1: Continue to evolve and improve NGDA datasets based on documented needs from federal, state and local agencies, tribes, and private and not-for-profit organizations. | Recurring, Completed for FY17 |
| Objective 1.2: Interact with geospatial advisory and stakeholder groups to ensure that federal elevation mapping programs support the broadest needs possible. | Recurring, Completed for FY17 |
| Objective 1.3: Using the Elevation Theme NGDA Lifecycle Maturity Assessment (LMA) scores as a guide, work to improve the overall health of every NGDA dataset and strengthen the NGDA management plans. | In Progress |
| Objective 1.4: Leverage the existing strategic plans and initiatives that support each of the NGDA Elevation Theme datasets. For example, the USGS 3D Elevation Program Initiative's *A Call for Action* and the draft National Coastal Mapping Strategy are primary strategic documents that provide guidance on elevation data acquisition, data standards, stewardship, dissemination, interagency coordination, and related topics. | Recurring, Completed for FY17 |
| Objective 1.5: Evaluate new types of elevation data collected by federal agencies that are currently not included the NGDA elevation dataset for addition to the NGDA portfolio to promote the managing of these important data as a capital asset. | Not Started |
| **Goal 2: Increase the *quantity* and availability of comprehensive elevation data for the building of a 3D Nation enriched by seamless elevation data.** | |
| Objective 2.1: Elevation mapping data programs establish and share annual acquisition, production and/or distribution goals to increase the availability of existing elevation data. | Recurring, Completed for FY17 |
| Objective 2.2: Improve on the existing good coordination among federal agencies, states, academia, private sector and other partners by documenting requirements, planned acquisitions and data holdings, and by identifying and addressing opportunities for, and obstacles to, collaboration on elevation data acquisition. | Recurring, Completed for FY17 |
| **Goal 3: Increase the *quality* and consistency of elevation datasets incorporated into the building of a 3D Nation enriched by seamless elevation data.** | |
| Objective 3.1: Increase awareness and use of federal geospatial standards and specifications throughout the geospatial community through FGDC standards endorsement opportunities, NGDA Elevation Theme Community webpage, education and outreach. | In Progress |
| Objective 3.2: Lead or facilitate the development and coordination of new geospatial specifications for elevation data. | Not Started |

**Table 10: 2017 Progress Summary for Theme Strategic Plan Goals and Objectives.**